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**Bibliography.**

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Summary.

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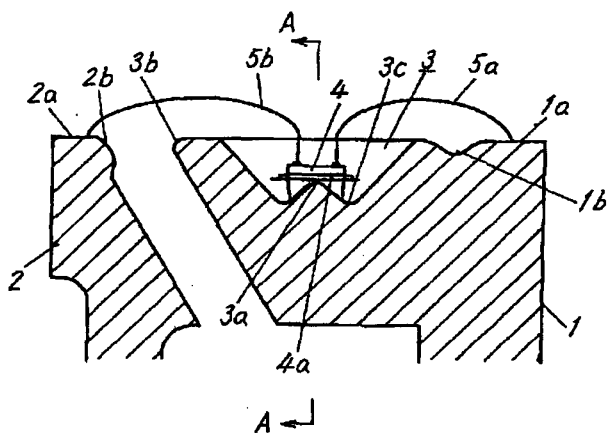
(57) [Abstract]

[Technical problem] The luminescence equipment in which a good display is possible is offered without causing the fall of the contrast of the display image by the light emitting device, even if it basks in outdoor daylight, such as sunlight.

[Means for Solution] In the luminescence equipment which made it flow through between the leadframes 2 which make a pair for this light emitting device 4 while carrying a light emitting device 4 in the mounting 3 prepared in the leadframe 1 The portion which is the field where leadframes 1 and 2 and mounting 3 point to the luminescence direction of a light emitting device 4, and receives the incidence of the light from the outside at least is equipped with a reflective brightness regulation means for the line of one articles instead of field reflection to be met in incidence outdoor daylight and to regulate reflective brightness as a reflected light distribution.

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## CLAIMS

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[Claim(s)]

[Claim 1] Semiconductor luminescence equipment which includes a reflective brightness regulation means regulate the reflective brightness of incidence outdoor daylight in the part which is the field where it has the loading flow section in which mounting through which carries the light emitting device which carried out the laminating of the semiconductor layer of p-n junction, and this light emitting device on a crystal substrate, and it is made to flow electrically was formed, and mounting points to the luminescence direction, and has the incidence of the light from the outside at least.

[Claim 2] A reflective brightness regulation means is semiconductor luminescence equipment according to claim 1 with which mounting becomes as a curved-surface profile in which it is formed in the front face of the portion \*(ed) by outdoor daylight, and incidence outdoor daylight is reflected as the reflected light which meets the line of one articles.

[Claim 3] A reflective brightness regulation means is semiconductor luminescence equipment containing the straight-line-like inclined plane profile in which it is formed in the front face of a portion on which mounting is \*(ed) by outdoor daylight, and incidence outdoor daylight is reflected as the reflected light which meets the line of one articles according to claim 1 or 2.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the semiconductor luminescence equipment which suppresses the reflection from the leadframe of the circumference of the light emitting device when starting the luminescence equipment which carries a Light Emitting Diode light emitting device in mounting of a leadframe, especially basking in outdoor daylight, such as

sunlight, or the front face of mounting, and enabled it to keep the picture by the light emitting device good.

[0002]

[Description of the Prior Art] The Light Emitting Diode light emitting device which formed the semiconductor cascade screen which carried out the laminating of the semiconductor thin film layer to the crystal substrate, and carried out p-n junction to it, and was equipped with the electrode by the side of p and n from the former is used abundantly as an object for luminescence display panels. The thing of this Light Emitting Diode light emitting device being carried after mounting beforehand formed in the leadframe which it has as a member for for example making it flowing electrically, and connecting with a leadframe by wirebonding is the fundamental composition.

[0003] Drawing 6 is the schematic diagram showing the conventional example of the loading structure of the light emitting device to mounting of such a leadframe.

[0004] The example of illustration is what can be used as a blue Light Emitting Diode which carried out the laminating of the semiconductor film of a gallium-nitride system compound. a light emitting device 51 Carry on mounting 52a of the shape of a bowl which formed the insulating substrate 51a in the upper limit of a leadframe 52, and it pastes up with a paste 53. 51c is connected very much to the leadframe 55 of another side which is making a leadframe 52 and this, and the pair with Wires 54a and 54b the 51b and n side the p side formed in the upper limit of a light emitting device 51, respectively. And the whole circumference of mounting 52a including a light emitting device 51 is closed by the epoxy resin 56.

[0005] With the Light Emitting Diode lamp containing such a light emitting device 51, leftward luminescence is obtained in drawing by making into an optical drawing side the upper surface of p type layer which occupies the field which contains 51b very much the p side, using the p-n junction region of the semiconductor film of the gallium-nitride system compound of a light emitting device 51 as a luminous layer. Moreover, in what used substrate 51a as transparent sapphire, it is reflected from this mounting 52a, and the light which goes to mounting 52a from a luminous layer joins luminescence from an optical drawing side also including a part for this reflection.

[0006] Each Light Emitting Diode lamp serves as a pixel, respectively, and a display and color display of various kinds of pictures are possible for the luminescence display panel which many Light Emitting Diode lamps [ equipped with the light emitting device 51 ] in three primary colors were gathered, and has arranged them on the other hand. And this luminescence display panel has a thing for the large-sized screens of an outdoor type from a comparatively small thing, and the installation is also various.

[0007]

[Problem(s) to be Solved by the Invention] The leadframe 52 which formed in one mounting 52a which carries a light emitting device 51 has a main thing made from iron, and in a thing with luminescence from an optical drawing side, and transparent substrate 51a, in order to reflect the light which leaks to a side [ of this substrate 51a ], and regions-of-back side, surface treatment by silver plating is performed. And although this silver plating is performed by the process made immersed in a plating bath, silver plating is carried out, even if it is difficult to plate only to the inner skin and mounting 52a applies a transverse-plane side to the end face side of a leadframe 52 from the field to turn to, since the mounting 52a itself is a small configuration.

[0008] On the other hand, although mounting 52a is also called a parabola since it has the function to also add the reflected light to luminescence while making it point to the luminescence direction of a light emitting device 51, the nose of cam of a leadframe 52 has many which were generally made into the flat side so that it may be easy to carry out bonding of the wires 54a and 54b. And to make the point of a leadframe 52 into thickness a certain grade is needed from the field on processing for

forming a parabola in the shape of a bowl.

[0009] However, it is thick in this way, a part for a point, i.e., mounting 52a, of a leadframe 52, and the apical surface of mounting 52a becomes flat [ the apical surface ] with the reflector of sunlight or the light of a from outside others, and image display by the light emitting device 51 is made confusing.

[0010] That is, when sunlight hits a part for the point of mounting 52a enclosed with the circle in drawing in the rightward direction, the reflected light of the arrow of facing the left [ whole ] almost of the apical surface of mounting 52a will be emitted. If it is remarkable at the morning when for example, the luminescence display panel is installed in the outdoors at, and such a thing becomes almost perpendicular [ the degree of incident angle of sunlight ], the time of twilight, etc. and sunlight hits in the degree of incident angle perpendicularly near the apical surface of mounting 52a or a leadframe 55, the whole simultaneously of an apical surface will serve as a reflected light side.

[0011] Thus, if sunlight hits and it is reflected from the apical surface of mounting 52a or a leadframe 55, since silver plating is given to these apical surfaces, the brightness by the reflected light also becomes quite high. And since the near reflected light is emitted white in the shape of [ which encloses each of the light emitting device 51 of a large number arranged at the luminescence display panel ] a grid, or silver, the contrast of each color of color luminescence by two or more light emitting devices 51 will be reduced. Each of a light emitting device 51 serves as a pixel, and the fall of such contrast brings a result which spoils the clearness of a picture to the display which carries out image display.

[0012] Thus, in some which carry the conventional light emitting device 51 in mounting 52a of a leadframe 52, since the reflection from the apical surface of mounting 52a etc. is not avoided when it basks in strong outdoor daylight like sunlight, there is a problem of having big influence on a display image.

[0013] The technical problem which should be solved in this invention is to offer the luminescence equipment in which a good display is possible, without causing the fall of the contrast of the display image by the light emitting device, even if it basks in outdoor daylight, such as sunlight.

[0014]

[Means for Solving the Problem] It carries out that this invention includes a reflective brightness regulation means regulate the reflective brightness of incidence outdoor daylight in the part which is the field where it has the loading flow section in which mounting through which carries the light emitting device which carried out the laminating of the semiconductor layer of p-n junction, and this light emitting device on a crystal substrate, and it is made to flow electrically was formed, and mounting points to the luminescence direction, and has the incidence of the light from the outside at least as the feature.

[0015] when it was such composition and the luminescence display panel which has arranged many light emitting devices, for example is installed in the outdoors, even if it basks in the sunlight at the time of a morning or twilight -- a leadframe -- a loading flow -- if it is the case where it considers as a member, high reflection of the brightness from mounting formed as a part of this leadframe will be suppressed by the reflective brightness regulation means, and the interference of the reflected light and the fall of contrast to luminescence from a light emitting device are prevented

[0016] In addition, in this invention, the loading flow member through which carries a light emitting device and it is made to flow electrically is a leadframe as shown in the term of the form of implementation of invention, in addition let them be various kinds of casts arranged as another object above a printed circuit board or a printed circuit board.

[0017]

[Embodiments of the Invention] The light emitting device to which invention according to claim 1

carried out the laminating of the semiconductor layer of p-n junction on the crystal substrate, It has the loading flow section in which mounting through which carries this light emitting device and it is made to flow electrically was formed. To the part which is the field where mounting points to the luminescence direction, and has the incidence of the light from the outside at least By what forms mounting in the part by making a loading flow member into a leadframe, including a reflective brightness regulation means to regulate the reflective brightness of incidence outdoor daylight High reflection of the brightness by this for example, leadframe, field reflection from mounting, etc. is suppressed, and it has operation of preventing the interference of the reflected light and the fall of contrast to luminescence from a light emitting device.

[0018] A reflective brightness regulation means is formed in the front face of a portion on which mounting is **\*(ed)** by outdoor daylight, and becomes as a curved-surface profile in which incidence outdoor daylight is reflected as the reflected light which meets the line of one articles, and invention according to claim 2 has operation of stopping the reflective brightness of outdoor daylight low only by configuration setup when manufacturing this leadframe and mounting, in the case where mounting is formed as a part of leadframe for example.

[0019] Invention according to claim 3 has operation of stopping the reflective brightness of outdoor daylight low only by configuration setup of a leadframe, like the case where it has a curved-surface profile, including the straight-line-like inclined plane profile in which a reflective brightness regulation means is formed in the front face of a portion on which mounting is **\*(ed)** by outdoor daylight, and reflects incidence outdoor daylight as the reflected light which meets the line of one articles.

[0020] Below, the example of the gestalt of operation of this invention is explained, referring to a drawing. It is drawing of longitudinal section according [ accord / the plan of drawing 1 / drawing of longitudinal section of the important section of the Light Emitting Diode lamp equipped with the Light Emitting Diode chip with which drawing 1 is formed of the gallium-nitride system compound semiconductor in the gestalt of 1 operation of this invention as a light emitting device, and drawing 2 / drawing 3 ] to the A-A line view of drawing 1 .

[0021] a loading flow [ in / the gestalt of this operation of one leadframe 1 / in drawing, it has the leadframes 1 and 2 of the couple by which the upper-limit section is closed by the epoxy resin, and ] -- it is considering as the member While being able to dent mostly the mounting 3 for carrying a light emitting device 4 in the upper limit of one leadframe 1 in the shape of a earthenware mortar and forming it, the whole inner skin is made into the shape of a mirror plane. A light emitting device 4 forms p lateral-electrode 4b and n lateral-electrode 4c in a upper-limit side while preparing crystal substrate 4a using transparent sapphire in a soffit side, and it is carrying out wirebonding of these each to leadframes 1 and 2 with Wires 5a and 5b.

[0022] A light emitting device 4 emits light towards the side and lower part also from crystal substrate 4a located in the luminous layer bottom while making p type layer which is the upper surface and contains p lateral-electrode 4b the main light drawing side where luminescence brightness is the highest.

[0023] As mounting 3 is shown in drawing 2 , it is formed in the shape of [ to which a flat-surface configuration carries out eccentricity of this, and arranges it to the square light emitting device 4 mostly / like ] a earthenware mortar, and the inner skin has the profile which draws a curve altogether on all the cross sections. And in order to reflect luminescence from crystal substrate 4a of a light emitting device 4 by the inner skin of mounting 3, reflective block 3a of the cross section of a trapezoidal shape is mostly formed in the pars basilaris ossis occipitalis of mounting 3, and the light emitting device 4 is held at this reflective block 3a bottom.

[0024] Here, the leadframe 2 of mounting 3 and another side which are prepared at a leadframe 1 and

its nose of cam makes the profile of the loose inclined plane which does not intersect perpendicularly with the luminescence direction, or a curved surface the whole or the thing given in part in the field overlooked in the luminescence direction of a light emitting device 4. That is, as shown in drawing 1, although apical surface 1a at the right end of a leadframe 1 is a plane, it applies to this apical surface 1a portion and mounting 3, and dents, and 1b is formed in the shape of [ loose ] a curved surface. And although the inner circumference veranda of the apical surface of mounting 3 is a plane, a part for a periphery marginal part is formed as a curve-like profile as circular face 3b so that it may stand in a row in crevice 1b. It is referred to as crevice 3c of the loose circular face which was also able to dent the boundary portion of reflective block 3a downward. Moreover, the portion which faces [ a mounting 3 side ] apical surface 2a of the leadframe 2 located in the left-hand side of mounting 3 although an outside half grade is a plane forms loose circular face 2b.

[0025] Moreover, about the apical surfaces 1a and 2a which are not formed as the shape of these curved surface, it is desirable to consider as the plane which does not intersect perpendicularly with the luminescence direction as what inclined in the shape of a straight line gently in the grade which can recognize the bonding side in the case of the bonding of Wires 5a and 5b. Even if it was the inclined plane of the shape of such a straight line, when outdoor daylight is received like the case where it considers as the shape of a curved surface, it is only generating the reflected light of one articles.

[0026] In addition, in order to show the profile of the shape of an above curved surface, leadframes 1 and 2 and the outline perspective diagram of the important section of mounting 3 are shown in drawing 4.

[0027] Drawing 5 is the cross section of an important section showing the posture of the luminescence equipment when including in the luminescence display panel arranged along with sheathing, such as a building, in a high position, and although considered as two arrays up and down in the example of illustration, in an actual luminescence display panel, it is undoubted that much luminescence equipments are uniformly arranged in the same flat surface.

[0028] The leadframe 1 linked to the printed circuit board (not shown) of a luminescence display panel is arranged as a posture of the vertical direction shown in drawing 2 so that drawing 5 may show. And in the array of such a leadframe 1, usually it considers as the posture leaned to the horizontal direction or ground side for a while, and the main optical axis from the main light drawing side of a light emitting device 4 serves as a field where the leadframe 1 and 2 and apical surface side of mounting 3 is \*(ed) by outdoor daylight, such as sunlight, when it is any.

[0029] In the above composition, when energized to a light emitting device 4, the light from the luminous layer of a p-n junction region leaks and comes from crystal substrate 4a using transparent sapphire also to down and the side at the same time it is emitted from the optical drawing side of the upper surface of p type layer, as stated also in advance. At this time, the light to which a light emitting device 4 leaks from the spread part and crystal substrate 4a side of the light on the main optical axis from the main light drawing side since the main light drawing side has entered deeply enough into mounting 3 is reflected by what inner skin of mounting 3 is made into the shape of a mirror plane for.

[0030] Here, the sunlight at the time of a morning or twilight is attained as a parallel ray from left-hand side to the array of the leadframe 1 shown in drawing 5. And since such sunlight emitted the reflected light by making the whole apical surface into a reflector when mounting and the nose of cam of a leadframe were flat sides, as shown in the conventional example of drawing 6, the contrast of the picture by many light emitting devices 4 was reduced.

[0031] On the other hand, in this invention, since the apical surfaces 1a and 2a of leadframes 1 and 2

and the nose of 'cam of' mounting 3 contain circular depression 1b and circular faces 2b and 3b in part, respectively, leadframes 1 and 2 and each apical surface of mounting 3 do not turn into a flat side where all are uniform. And about the apical surfaces 1a and 2a which are not formed as the shape of these curved surface, if it considers as the plane which does not intersect perpendicularly with the luminescence direction as what inclined gently in the grade which can recognize the bonding side of Wires 5a and 5b, even if sunlight shines, generating of the big reflected light by field reflection will be suppressed.

[0032] That is, even when sunrays become horizontal from left-hand side in drawing 5, the inner skin of mounting 3 is a earthenware mortar-like, moreover, since the cross section is circular, there is no reflection in a common field and the reflected light appears as reflection on the line of one articles which revolves inner skin to the hoop direction. Moreover, since each of depression 1b and circular face 2b of leadframes 1 and 2, circular face 3b of mounting 3, and crevice 3c is also curved surfaces-like, there is no generating of the reflected light with the similarly high brightness by field reflection, and it is held down by the reflection on the line of one articles which revolves these curved surfaces in the deflection direction. Furthermore, let sunlight be the reflected light on the line of one articles also by considering as the inclined plane of the shape of a straight line of the loose uniform angle which does not intersect perpendicularly with the luminescence direction as the apical surface of leadframes 1 and 2 was described previously.

[0033] and sunlight is not horizontal incidence, by the case of the incidence from a slant top or right and left, similarly, it is markedly alike and generating of the field reflection by leadframes 1 and 2 and mounting 3 is suppressed, when an apical surface calls at a uniform flat side like structure before

[0034] Thus, even if it basks in a morning, the sunlight at the time of twilight, or other strong outdoor daylight by having considered as the profile which included the curved-surface element in the configuration of the leadframes 1 and 2 of the circumference of a light emitting device 4, or the point of mounting 3, it is lost that these are reflected as the reflected light with high brightness, only the part which meets on a line is reflected, and the amount of reflection as the whole is reduced.

Therefore, the display on which white or the strong silver reflected lights are not scattered in the shape of a grid to the picture by the light emitting device 4 is attained, and the fall of the contrast of a color picture is prevented effectively. Consequently, even if it is the installation conditions on which the incidence of sunlight or other strong outdoor daylight attains to a luminescence display panel, the clear image display which eliminated the disturbance by outdoor daylight can be maintained.

[0035]

[Effect of the Invention] In invention of a claim 1, since high reflection of the brightness for example, by the field reflection from mounting formed in the leadframe etc. is suppressed and the interference of the reflected light and the fall of contrast to luminescence from a light emitting device are prevented, even if it is the large-sized luminescence display panel of the outdoor installation soon ~~\*\*~~(ed) by sunlight, the picture by the light emitting device can always be displayed vividly, and can be used more suitably as a display for a display.

[0036] In invention of a claim 2 and a claim 3, it becomes unnecessary, since the reflective brightness of outdoor daylight is low stopped only by configuration setup when manufacturing mounting, for example to a leadframe special processing [ coat / for being nonreflective to the field which basks in outdoor daylight, for example ], while the manufacturing process has also been as usual, it ends, and there is also no obstacle in the cost side by retooling.



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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] Drawing of longitudinal section showing the important section of the luminescence equipment using the gallium-nitride system compound semiconductor light emitting device by the gestalt of 1 operation of this invention

[Drawing 2] The plan of drawing 1

[Drawing 3] Drawing of longitudinal section by the A-A line view of drawing 1

[Drawing 4] The outline perspective diagram showing a leadframe and the important section for a point of mounting

[Drawing 5] The outline cross section showing the array posture of the leadframe to a luminescence display panel

[Drawing 6] The schematic diagram showing the situation of reflection of the sunlight in the conventional Light Emitting Diode lamp

[Description of Notations]

1 Leadframe (Loading Flow Member)

1a Apical surface

1b Depression

2 Leadframe

2a Apical surface

2b Circular face

3 Mounting

3a Reflective block

3b Circular face

3c Crevice

4 Light Emitting Device

4a Crystal substrate

5a, 5b Wire

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[Translation done.]

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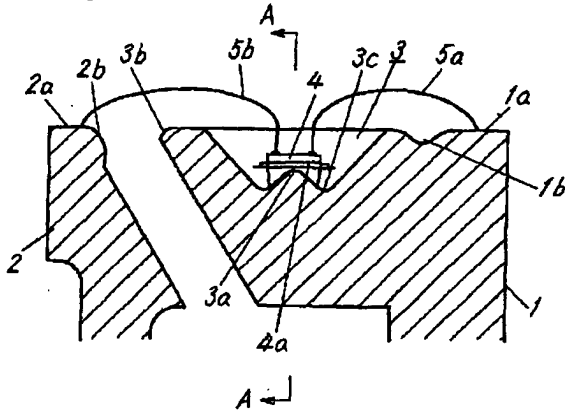
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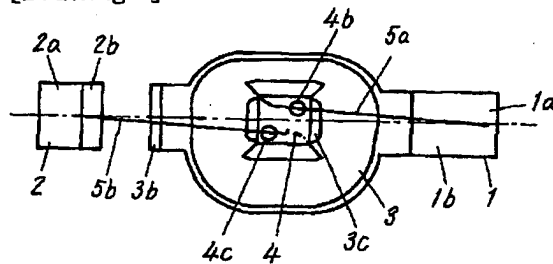
## DRAWINGS

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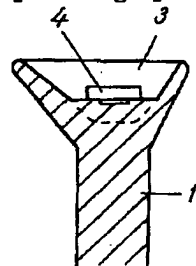
[Drawing 1]



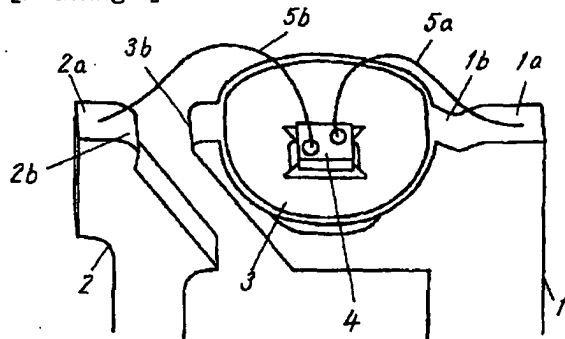
[Drawing 2]



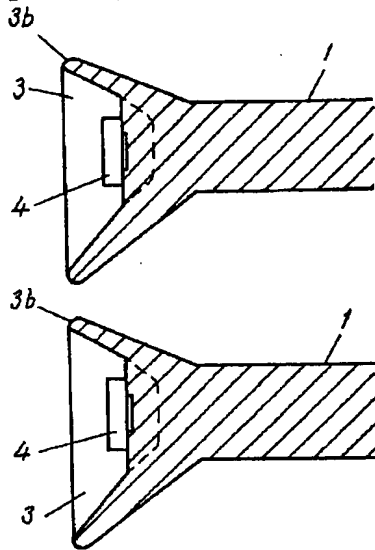
[Drawing 3]



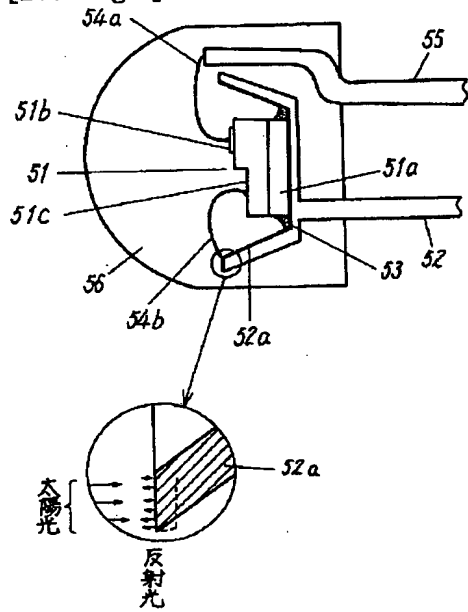
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]

(11)特許出願公開番号

(43)公開日 平成11年(1999)4月23日

A

**最終頁に続く**

## 【特許請求の範囲】

【請求項1】 結晶基板の上にp-n接合の半導体層を積層した発光素子と、この発光素子を搭載して電氣的に導通させるマウントを形成した搭載導通部とを備え、マウントが発光方向を指向する面であって少なくとも外部からの光の入射がある部位に、入射外光の反射輝度を規制する反射輝度規制手段を含む半導体発光装置。

【請求項2】 反射輝度規制手段は、マウントが外光に曝される部分の表面に形成され入射外光を1条の線に沿う反射光として反射させる曲面プロファイルとなる請求項1記載の半導体発光装置。

【請求項3】 反射輝度規制手段は、マウントが外光に曝される部分の表面に形成され入射外光を1条の線に沿う反射光として反射させる直線状の傾斜面プロファイルを含む請求項1または2記載の半導体発光装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、LED発光素子をリードフレームのマウントに搭載する発光装置に係り、特に太陽光等の外光を浴びたときの発光素子周りのリードフレームやマウントの表面からの反射を抑えて発光素子による画像を良好に保てるようにした半導体発光装置に関する。

## 【0002】

【従来の技術】従来から、結晶基板に半導体薄膜層を積層してp-n接合した半導体積層膜を形成してp側及びn側の電極を備えたLED発光素子が発光表示パネル用として多用されている。このLED発光素子は、たとえば電氣的に導通させるための部材として備えるリードフレームに予め形成されたマウントの上に搭載され、ワイヤボンディングによってリードフレームに接続するというものがその基本的な構成である。

【0003】図6はこのようなリードフレームのマウントに対する発光素子の搭載構造の従来例を示す概略図である。

【0004】図示の例は、窒化ガリウム系化合物の半導体膜を積層した青色LEDとして使用できるものであり、発光素子51は、その絶縁性の基板51aをリードフレーム52の上端に形成した碗状のマウント52aの上に搭載してペースト53によって接着され、発光素子51の上端にそれぞれ形成したp側極51b及びn側極51cをワイヤ54a、54bによってリードフレーム52及びこれと対をなしている他方のリードフレーム55に接続している。そして、発光素子51を含めてマウント52a周りの全体がエポキシ樹脂56によって封止されている。

【0005】このような発光素子51を含むLEDランプでは、発光素子51の窒化ガリウム系化合物の半導体膜のp-n接合域を発光層として、p側極51bを含む領域を占めるp型層の上面を光取出し面として図におい

て左向きの発光が得られる。また、基板51aを透明のサファイアとしたものでは、発光層からマウント52aに向かう光がこのマウント52aから反射され、この反射分も含めて光取出し面からの発光に合流する。

【0006】一方、発光素子51を備えた3原色のLEDランプを多数集合させて配置した発光表示パネルは、各LEDランプがそれぞれ画素となって各種の画像の表示及びカラー表示が可能である。そして、この発光表示パネルは比較的小型のものから屋外用の大型画面用のものがあり、その設置場所もさまざまである。

## 【0007】

【発明が解決しようとする課題】発光素子51を搭載するマウント52aを一体に形成したリードフレーム52は鉄を素材とするものが主であり、光取出し面からの発光及び透明の基板51aをもつものではこの基板51aの側方及び背部側に漏れる光を反射させるため、たとえば銀メッキによる表面処理が施される。そして、この銀メッキはメッキ浴に浸漬させる工程によって行なわれるが、マウント52a自身は小さい形状であるためその内周面だけにメッキを施すことは困難であり、マウント52aが正面側を向く面からリードフレーム52の基端側にかけても銀メッキされる。

【0008】一方、マウント52aは発光素子51の発光方向を指向させるとともに反射光も発光に加える機能を持つのでパラボラとも称されるが、ワイヤ54a、54bをボンディングしやすいようにリードフレーム52の先端は一般に平坦面としたものが多い。そして、碗状にパラボラを形成するための加工上の面から、リードフレーム52の先端部は或る程度肉厚とすることが必要とされている。

【0009】ところが、このようにリードフレーム52の先端部分すなわちマウント52aが肉厚であってその先端面が平坦であると、マウント52aの先端面が太陽光やその他の外からの光の反射面となって発光素子51による画像表示を紛らわしくする。

【0010】すなわち、図中の円で囲んだマウント52aの先端部分に右向きの方向に太陽光が当たると、マウント52aの先端面のほぼ全体が左向きの矢印の反射光を放つことになる。このようなことは、たとえば発光表示パネルが屋外に設置されていて、太陽光の入射角度がほぼ垂直となる朝や夕暮れ時等に顕著であり、太陽光がマウント52aやリードフレーム55の先端面に垂直に近い入射角度で当たると、先端面のほぼ全体が反射光面となる。

【0011】このように太陽光が当たってマウント52aやリードフレーム55の先端面から反射されると、これらの先端面には銀メッキが施されているので、反射光による輝度もかなり高くなる。そして、発光表示パネルに配置された多数の発光素子51のそれぞれを取り囲むようなグリッド状に白色または銀色に近い反射光が放た

れるので、複数の発光素子51によるカラー発光のそれぞれの色のコントラストを低下させてしまう。このようなコントラストの低下は、発光素子51のそれぞれが画素となって画像表示するディスプレイに対して、画像の鮮明さを損ねる結果となる。

【0012】このように、従来の発光素子51をリードフレーム52のマウント52aに搭載するものでは、太陽光等のように強い外光を浴びたときにマウント52aの先端面等からの反射が避けられないため、表示画像に大きな影響を及ぼすという問題がある。

【0013】本発明において解決すべき課題は、太陽光等の外光を浴びても発光素子による表示画像のコントラストの低下を招くことなく良好な表示が可能な発光装置を提供することにある。

【0014】

【課題を解決するための手段】本発明は、結晶基板の上にp-n接合の半導体層を積層した発光素子と、この発光素子を搭載して電気的に導通させるマウントを形成した搭載導通部とを備え、マウントが発光方向を指向する面であって少なくとも外部からの光の入射がある部位に、入射外光の反射輝度を規制する反射輝度規制手段を含むことを特徴とする。

【0015】このような構成であれば、たとえば発光素子を多数配置した発光表示パネルを屋外に設置したとき、朝や夕暮れ時の太陽光を浴びても、たとえばリードフレームを搭載導通部材とする場合であればこのリードフレームの一部として形成したマウントからの輝度の高い反射が反射輝度規制手段によって抑えられ、発光素子からの発光に対する反射光の干渉やコントラストの低下が防止される。

【0016】なお、本発明においては、発光素子を搭載して電気的に導通させる搭載導通部材は、発明の実施の形態の項に示すようにリードフレームであり、この他にもプリント基板またはプリント基板の上方に別体として配置する各種の成型品とすることができる。

【0017】

【発明の実施の形態】請求項1に記載の発明は、結晶基板の上にp-n接合の半導体層を積層した発光素子と、この発光素子を搭載して電気的に導通させるマウントを形成した搭載導通部とを備え、マウントが発光方向を指向する面であって少なくとも外部からの光の入射がある部位に、入射外光の反射輝度を規制する反射輝度規制手段を含むものであり、たとえば搭載導通部材をリードフレームとしてその一部にマウントを形成するものでは、このリードフレームやマウントからのたとえば面反射等による輝度の高い反射が抑えられ、発光素子からの発光に対する反射光の干渉やコントラストの低下を防ぐという作用を有する。

【0018】請求項2に記載の発明は、反射輝度規制手段は、マウントが外光に曝される部分の表面に形成され

入射外光を1条の線に沿う反射光として反射させる曲面プロフィールとしてなるものであり、たとえばマウントをリードフレームの一部として形成した場合は、このリードフレーム及びマウントを製作するときの形状設定だけで外光の反射輝度を低く抑えるという作用を有する。

【0019】請求項3に記載の発明は、反射輝度規制手段は、マウントが外光に曝される部分の表面に形成され入射外光を1条の線に沿う反射光として反射させる直線状の傾斜面プロフィールを含むものであり、曲面プロフィールを持つ場合と同様に、リードフレームの形状設定だけで外光の反射輝度を低く抑えるという作用を有する。

【0020】以下に、本発明の実施の形態の具体例を図面を参照しながら説明する。図1は本発明の一実施の形態における窒化ガリウム系化合物半導体によって形成されるLEDチップを発光素子として備えるLEDランプの要部の縦断面図、図2は図1の平面図、及び図3は図1のA-A線矢視による縦断面図である。

【0021】図において、その上端部がエポキシ樹脂によって封止される一対のリードフレーム1、2を備えて、一方のリードフレーム1を本実施の形態における搭載導通部材としている。一方のリードフレーム1の上端には発光素子4を搭載するためのマウント3をほぼすり鉢状に凹ませて形成するとともにその内周面の全体を鏡面状としている。発光素子4は、下端側に透明のサファイアを用いた結晶基板4aを設けるとともに上端側にp側電極4b及びn側電極4cを形成し、これらのそれぞれをワイヤ5a、5bによってリードフレーム1、2にワイヤボンディングしている。

【0022】発光素子4はその上面であってp側電極4bを含むp型層を発光輝度が最も高い主光取出し面とするとともに、発光層の下側に位置している結晶基板4aからもその側方及び下方に向けて発光する。

【0023】マウント3は、図2に示すように、平面形状がほぼ正方形の発光素子4に対してこれを偏心させて配置するようなすり鉢状に形成され、その内周面は全横断面において全て曲線を描くプロフィールを持つ。そして、発光素子4の結晶基板4aからの発光をマウント3の内周面で反射させるため、マウント3の底部にはほぼ台形状の断面の反射ブロック3aを形成し、この反射ブロック3aの上側に発光素子4が保持されている。

【0024】ここで、リードフレーム1とその先端に設けるマウント3及び他方のリードフレーム2が発光素子4の発光方向に臨む面には、発光方向と直交しない緩やかな傾斜面または曲面のプロフィールを全体または一部に持たせるものとする。すなわち、図1に示すように、リードフレーム1の右端の先端面1aは平面状であるが、この先端面1a部分とマウント3とにかけて凹み1bが緩やかな曲面状に形成されている。そして、マウント3の先端面は内周縁側は平面状であるが外周縁部分は凹部1bに連なるように円弧面3bとして曲線状のプロフィ

ルとして形成されている。反射ブロック3aの境界部分も下に凹ませた緩やかな円弧面の凹部3cとしている。また、マウント3の左側に位置しているリードフレーム2の先端面2aは、外側半分程度が平面状であるが、マウント3側に臨む部分は緩やかな円弧面2bを形成している。

【0025】また、これらの曲面状として形成されていない先端面1a、2aについては、ワイヤ5a、5bのボンディングの際のボンディング面の認識が可能な程度に緩やかに直線状に傾斜したものとして発光方向と直交しない平面状とすることが好ましい。このような直線状の傾斜面であっても、曲面状とした場合と同様に外光を受けたときには1条の反射光を発生するのみである。

【0026】なお、以上のような曲面状のプロフィールを示すためにリードフレーム1、2及びマウント3の要部の概略斜視図を図4に示す。

【0027】図5はビル等の外装に沿って高い位置に配置される発光表示パネルに組み込んだときの発光装置の姿勢を示す要部の断面図であり、図示の例では上下に2個の配列としているが実際の発光表示パネルでは同一平面内に多数の発光装置が一樣に配列されることは無論である。

【0028】図5から判るように、発光表示パネルのプリント基板(図示せず)に接続しているリードフレーム1は、図2に示す上下方向の姿勢として配列される。そして、このようなリードフレーム1の配列において、発光素子4の主光取出し面からの主光軸は水平方向または地面側に少し傾けた姿勢とすることが通常であり、いずれの場合においてもリードフレーム1、2及びマウント3の先端面側が太陽光等の外光に曝される面となる。

【0029】以上の構成において、発光素子4へ通電されるときにはp-n接合域の発光層からの光は、先にも述べたようにp型層の上面の光取出し面から放出されると同時に透明のサファイアを利用した結晶基板4aから下方向及び側方へも漏れ出る。このとき、発光素子4はその主光取出し面がマウント3の中に十分に深く入り込んでいるので、主光取出し面からの主光軸上の光の拡散分や結晶基板4a側から漏れる光はマウント3の内周面を鏡面状としておくことにより反射される。

【0030】ここで、朝や夕暮れ時の太陽光は、図5に示したリードフレーム1の配列に対して左側からの平行光線として達する。そして、図6の従来例に示したようにマウントやリードフレームの先端が平坦面であれば、このような太陽光が先端面の全体を反射面として反射光を放つので、多数の発光素子4による画像のコントラストを低下させてしまうというものであった。

【0031】これに対し、本発明では、リードフレーム1、2の先端面1a、2a及びマウント3の先端はそれぞれ一部に円弧状の凹み1b、円弧面2b、3bを含むので、リードフレーム1、2及びマウント3のそれぞれ

の先端面は全てが一樣な平坦面とはならない。そして、これらの曲面状として形成されていない先端面1a、2aについては、ワイヤ5a、5bのボンディング面の認識が可能な程度に緩やかに傾斜したものとして発光方向と直交しない平面状としておけば、太陽光が射しても、面反射による大きな反射光の発生が抑えられる。

【0032】すなわち、太陽光線が図5において左側から水平方向となるときでも、マウント3の内周面はすり鉢状であってしかも横断面が円弧状なので、共通の面での反射はなく、反射光は内周面をその周方向に巡る1条のライン上の反射として現れる。また、リードフレーム1、2の凹み1b及び円弧面2bやマウント3の円弧面3bや凹部3cもいずれも曲面状なので、同様に面反射による輝度の高い反射光の発生はなく、これらの曲面をその曲がり方向に巡る1条のライン上の反射に抑え込まれる。更に、リードフレーム1、2の先端面を先に述べたように発光方向と直交しない緩やかな一樣な角度の直線状の傾斜面とすることによっても、太陽光を1条のライン上の反射光とすることができる。

【0033】そして、太陽光が水平方向の入射でなくて、斜め上や左右のいずれかからでの入射の場合でも、同様にリードフレーム1、2及びマウント3による面反射の発生は、従来構造のように先端面が一樣な平坦面による場合に比べると格段に抑えられる。

【0034】このように、発光素子4周りのリードフレーム1、2やマウント3の先端部の形状に曲面要素を含ませたプロフィールとしたことによって、朝や夕暮れ時の太陽光やその他の強い外光を浴びても、これらが輝度の高い反射光として反射されることがなくなり、ライン上に沿う一部だけが反射され、全体としての反射量が低減される。したがって、発光素子4による画像に対して白または銀色の強い反射光がグリッド状に散乱することがない表示が可能となり、カラー画像のコントラストの低下が効果的に防止される。その結果、太陽光やその他の強い外光の入射が発光表示パネルに及ぶような設置条件であっても、外光による外乱を排除した鮮明な画像表示を保つことができる。

【0035】

【発明の効果】請求項1の発明では、リードフレーム等に形成したマウントからのたとえば面反射等による輝度の高い反射が抑えられ、発光素子からの発光に対する反射光の干渉やコントラストの低下が防止されるので、太陽光に直に曝される屋外設置の大型の発光表示パネルであっても、発光素子による画像を常に鮮明に表示でき、表示用ディスプレイとしてより好適に利用できる。

【0036】請求項2及び請求項3の発明では、たとえばリードフレームにマウントを製作するときの形状設定だけで外光の反射輝度が低く抑えられるので、たとえば外光を浴びる面に無反射のためのコーティングを施す等の特別の処理が不要となり、製造工程も従来通りのまま

で済み、設備変更によるコスト面での障害もない。

【図面の簡単な説明】

【図1】本発明の一実施の形態による窒化ガリウム系化合物半導体発光素子を用いた発光装置の要部を示す縦断面図

【図2】図1の平面図

【図3】図1のA-A線矢視による縦断面図

【図4】リードフレーム及びマウントの先端部分の要部を示す概略斜視図

【図5】発光表示パネルへのリードフレームの配列姿勢を示す概略断面図

【図6】従来のLEDランプにおける太陽光の反射の状況を示す概略図

【符号の説明】

1 リードフレーム（搭載導通部材）

1a 先端面

1b 凹み

2 リードフレーム

2a 先端面

2b 円弧面

3 マウント

3a 反射ブロック

3b 円弧面

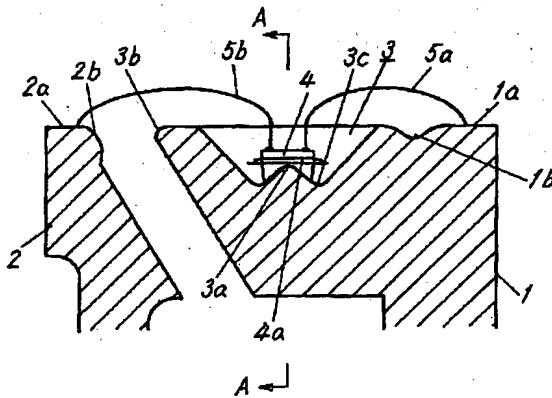
3c 凹部

4 発光素子

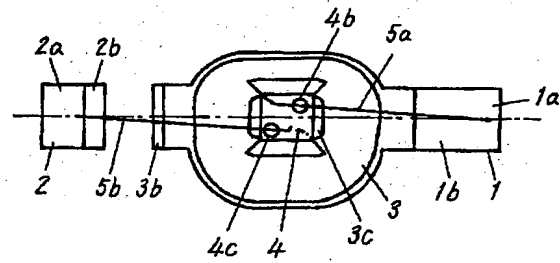
4a 結晶基板

5a, 5b ワイヤ

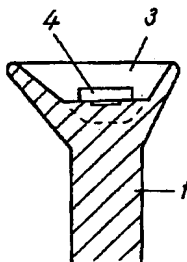
【図1】



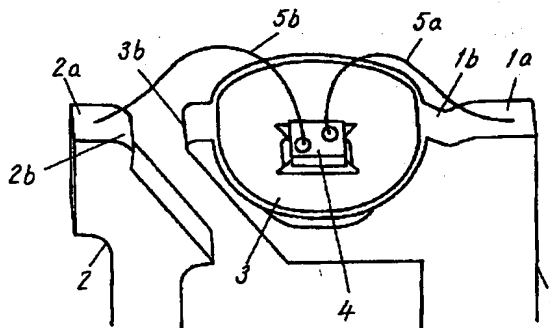
【図2】



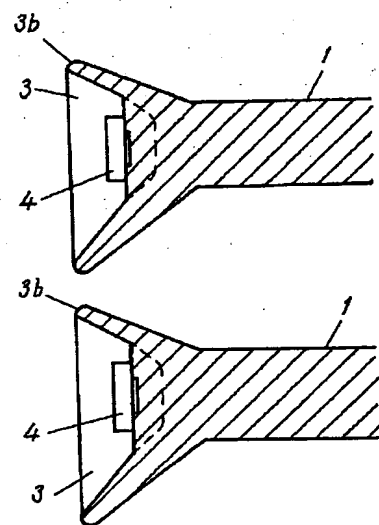
【図3】



【図4】

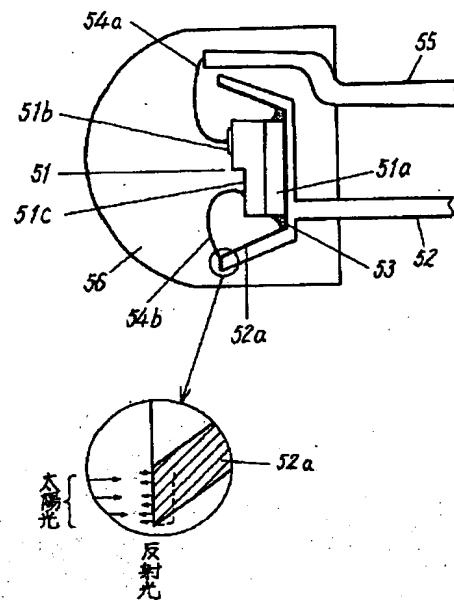


【図5】





【図6】



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フロントページの続き

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